Benjamin G. Pierce

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RESEARCH INTERESTS

Photovoltaics **Machine Learning** **Computer Vision** **High-Performance Computing**

EDUCATION

Case Western Reserve University
Aug 2017 – May 2021
B.S. Computer Science
Cleveland, OH

- GPA: 3.6
- Coursework: Algorithms, Databases, Machine Learning, Theoretical Computer Science, Cryptology, Linear Algebra, Probabilistic Graphical Models, High Performance Computing, Computational Perception
- Minor in Applied Data Science

EXPERIENCE

Sandia National Laboratories
Present
R&D Systems Research Analyst
Albuquerque, NM

Member of the Technical Staff, Photovoltaics and Materials Tech.
Primary project: Improve energy yield of single axis trackers via a new, machine learning based control algorithm that takes sky images as input
Cleaned data set of over 100K images (months of 1 minute interval data) in Sandia HPC enviroment
Created novel multi-input convolutional neural network to find angle of maximal irradiance

Solar Durability and Lifetime Extension Center
Aug 2018 – May 2021
Research Assistant
Cleveland, OH

Duties include data analytics, PV characterization in the lab, and computational infrastructure maintenance.

PUBLICATIONS

- **B. G. Pierce**, J. L. Braid, J. S. Stein, and D. Riley, "Cloud Segmentation and Motion Tracking in Sky Images," *IEEE Journal of Photovoltaics*, Accepted 17 Oct 2022
- **B. G. Pierce**, J. L. Braid, J. S. Stein, J. Augustyn, and D. Riley, "Solar Transposition Modeling via Deep Neural Networks With Sky Images," *IEEE Journal of Photovoltaics*, vol. 12, no. 1, pp. 145–151, 2021 . https://ieeexplore.ieee.org/abstract/document/9623380
- **Benjamin G Pierce**, Ahmad Maroof Karimi, Jiqi Liu, Roger H French, and Jennifer L Braid. "Identifying Degradation Modes of Photovoltaic Modules Using Unsupervised Machine Learning on Electroluminescence Images" *IEEE Photovoltaics Specialists Conference 2020*
- Carolina M. Whitaker, **Benjamin G Pierce**, Ahmad Maroof Karimi, Roger H French, and Jennifer L Braid. "PV Cell Cracks and Impacts on Electrical Performance" *IEEE Photovoltaics Specialists Conference 2020*
- Ahmad Maroof Karimi, Justin S Fada, Nicholas A Parrilla, **Benjamin G Pierce**, Mehmet Koyutürk, Roger H French, and Jennifer L Braid. "Generalized and Mechanistic PV Module Performance Prediction from Computer Vision and Machine Learning on Electroluminescence Images." *IEEE Journal of Photovoltaics*
- Carolina M. Whitaker, **Benjamin G. Pierce**, Roger H. French, and Jennifer L. Braid, "Properties of PV Cell Fractures and Effects on Performance of Al-BSF and PERC Modules," presented at the 48th PVSC, Virtual, 2021.

- **Benjamin Pierce**, Jennifer L. Braid, Joshua S. Stein, Jim Augustyn, Daniel Riley, "Solar Transposition Modeling via Deep Neural Networks with Sky Images", *IEEE Journal of Photovoltaics*, submitted following invitation.
- A. M. Karimi, **B. G. Pierce**, J. S. Fada, N. A. Parrilla, R. H. French, and J. L. Braid, PVimage: Package for PV Image Analysis and Machine Learning Modeling. 2020. Accessed: Feb. 28, 2020. [Online]. Available: https://pypi.org/project/pvimage/
- M. Adachi, S. Hamaya, D. Morikawa, **B. Pierce**, A. Karimi, Y. Yamagata, K. Tsuda, R. French, H. Fukuyama, "Temperature dependence of crystal growth behavior of AlN on Ni-Al and demonstration of thick AlN film growth using electromagnetic levitation and computer vision technique" in Materials Science in Semiconductor Processing [Accepted, Oct 22]

PRESENTATIONS

- "Approaches to Sky Image Based Single Axis Tracker Algorithms," presented at the 2022 15th PV Performance Modeling Workshop, Salt Lake City, UT. [Online]
- "Cloud Segmentation and Motion Tracking in Sky Images," presented at IEEE PVSC 2022
- "Solar Transposition Modeling via Deep Neural Networks With Sky Images," presented at IEEE PVSC 2021

AWARDS

DOE Science Undergraduate Laboratory Internships (SULI) — Lawrence Berkeley National Lab
Offered SULI funding for Summer 2020, declined for Sandia — May 2020

Computer and Data Sciences Research Award — CWRU
To the senior demonstrating exceptional research potential — May 2021

Herbold Scholar — CWRU
Awarded funding for Master's program at CWRU — May 2021

IEEE PVSC 2022 Session Chair — IEEE PVSC
Co-chair for Solar Resource and PV Forecasting, Session II — June 2022

TECHNOLOGIES

Programming Languages	Python, Julia, R, Java, C, bash
Libraries	PyTorch, TensorFlow, NumPy, sklearn, pandas, pvlib-python
Databases	Hadoop2/Hbase, MySQL
Other	High-performance computing, LaTeX

ACTIVITIES

Association for Computing Machinery	Student Member, 2019
Institute of Electrical and Electronics Engineers	Student Member, 2020
Study Abroad	Cape Town, South Africa, Summer 2018
Volunteer Correspondent	Prison Mathematics Project, Summer 2021-